[Original Article]

Sustainability education in textile and apparel programs in higher education
- A web-based content analysis -

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Abstract

This study explores sustainability education in textile and apparel (T&A) programs in U.S. higher education institutions. Specifically, the researchers study whether more courses with sustainability focus are offered in higher-ranked institutions and explore whether sustainability is taught more in specific T&A related subject fields. Content analysis was conducted for 3,200 courses found in online course catalogs or the course information sites of 69 institutions. Institutions were selected from the 2015 rankings of the top 50 fashion design and top 50 fashion merchandising schools in the US on www.fashion-schools.org. All cases were coded by two coders with a Cohen's Kappa score of 97.5%, indicating good interrater reliability. Coded data were analyzed through descriptive statistics, correlation analysis, and t-tests. The findings show that sustainability is being integrated into the curricula and across courses of T&A programs in the U.S. Over half of the institution surveyed offered at least one sustainability embedded course. Higher ranked institutions provided more sustainability-related courses than power-ranked institutions. A natural match between the subject field and specific sustainability theme was observed (e.g., cultural diversity in history/culture and social psychology/education; recycle/reuse in textile science; sustainability in fashion design; social responsibility and ethics in industry/consumer). The need to introduce sustainability in courses holistically is discussed, whereby sustainability within the industry supply chain is examined in a connected way.

Keywords: sustainability, education, curriculum, textile, apparel

I. Introduction

Sustainability is a composite view of diverse and interwoven themes related to human welfare, economic growth, and the natural environment (United Nations General Assembly [UNGA], 2005), which is a key issue in the textile and apparel (T&A) field. Most T&A companies are involved in global sourcing and tend to have difficulties in overseeing and enforcing sustainable practices with overseas factories and workers. The textile and apparel industry has been guilty of harmful business practices by generating pollution and wastes from production and consumption

process of T&A products. For example, 1,500 liter of waste water is discharged for production of a pair of jeans; and 92 million tons of textile waste is produced each year (Shin, 2017). Given these challenges, fashion brands have expressed their interest in sustainability-related business activities. For example, Levi's has a separate team for *Social and Environmental Sustainability* and created initiatives to reduce water waste in the manufacturing process through the "Water<Less" project. Levi's also uses cottons produced through environment-friendly processes as a member of the *Better Cotton Initiative* and puts a specific label "a care tag for our planet" on their products (Joule, 2011). American Apparel produces fabrics following sustainability standards and offers supportive care to their factory workers by offering free health facilities and services (Orzada & Cobb, 2011).

Inclusion of sustainable development as part of the education offering is a crucial paradigmatic shift within higher education (Deale, Nichol, Jacques, & Jacques, 2009). The United Nations declared 'the decade 2005-2014' as the time for education in sustainable development (UNESCO, n.d.). As of January 2016, 499 educational institutions worldwide signed the Talloires Declaration, a blueprint for incorporating sustainability in learning and teaching (Universal Leaders for a Sustainable Future, 2016). As sustainability education continues to be a growing issue, sustainability in higher education is explored in several fields (Chawla, 2015). For example, Wu, Huang, Kuo, and Wu (2010) conducted a web-based content analysis of management education for sustainability-related curricula and found that business schools frequently offer ethics, sustainability, and corporate social responsibility content in courses. Chawla (2015) also found sustainability to be prominent in hospitality management curricula.

Some studies offer insight into how higher education can support sustainability in T&A. For example, researchers examined the sustainability knowledge levels and perspectives of T&A students (DeLong,

Caston, Min, & Lee, 2016). In addition, researchers introduced individual courses that embrace sustainability themes (Fletcher & Williams, 2013; Gam & Banning, 2011; Jang, 2015; Lee & Choy, 2014) and presented teaching strategies to combine reading, discussion, and purposive projects in sustainability-related T&A courses (Landgren & Pasricha, 2011). Although examples of exemplary practices related to the teaching and learning of sustainability can be found in the literature, there is little research offering a broad overview of how sustainability education is incorporated in the T&A area in terms of curricular and course options.

The purpose of this study is to provide a holistic picture of the current state of T&A education for sustainability based on an exploratory content analysis of the course offerings of major institutions in the United States. This study examines how sustainability is integrated in the T&A courses of the top 50 universities in fashion merchandising and fashion design fields in the U.S. Research questions explore the 1) thematic categories of sustainability courses taught in the T&A area, 2) offerings of sustainability courses by T&A subject fields, and 3) offering of sustainability courses by T&A institutions. Universities need to prepare future leaders to make best decisions on critical sustainability issues. Students should be trained to make critical enquiries and demonstrate systematic thinking when exploring problems and generating solutions in an interdisciplinary and intercultural setting. Knowing the current patterns of sustainability education in the T&A area offers educators insight into the best practices for incorporating sustainability themes in diverse subject fields.

Ⅱ. Literature Review

1. Sustainability in business

Sustainability is defined as a socio-ecological process characterized by the pursuit of common goals with three dimensions: economic development, social

development, and environmental protection (UNGA, 2005). Sustainable business is an enterprise that achieves long-term competitiveness and continuous advancements with minimal negative impact on the global or local environment, community, society, or economy. The business takes into account responsibilities towards society, protecting the environments, and respecting human rights (Park, Kim, & Lee, 2012).

There have been several standards and guidelines for sustainability in business, including ISO26000, Global Reporting Initiative of United National Environment Program (UNEP), and Dow Jones Sustainability Indices. In Korea, there were efforts to establish national organizations in charge of standards and policies for sustainability in business. The Korean Standards Association developed the 'Korean Sustainability Index' based on ISO26000. The Index consists of seven key categories such as organization governance (i.e., strengthen management transparency), human rights (i.e., protection of minority groups), labor (i.e., fair and stable employment), environment (i.e., prevention of environmental pollution), public operation (i.e., corruption prevention), consumer (i.e., fair marketing practice), and community participation and development (Korea Sustainability Conference, n.d.). This shows the impact of sustainability embedded in the interrelationships and interdependencies across economic, environmental, social, and cultural conditions.

Companies in the T&A industry collaborate with various organizations (e.g., non-government, non-profit) when implementing the adoption of sustainable practices within business. For example, leading companies such as Inditex, Fast Retailing, Nike, Walmart, Ikea, Li & Fung, and Toray as well as universities and organizations in the T&A area participate in the Sustainability for Apparel Coalition (SAC) to discuss and develop sustainable policies, standards, and strategies (SAC, n.d.). There have been research efforts to broaden views on sustainability and set up strate-

gies to promote sustainability in the T&A industry (Hill & Lee, 2012; Ritch & Schröder, 2012). Most studies examine and evaluate business practices related to sustainability or consumer responses toward those practices (Ju & Chung, 2015; Song & Shin, 2017). However, studies that focus on sustainability education have been limited in spite of the fact that incorporation of sustainability themes in education would broaden the perspective of individuals or practitioners and support their future work.

2. Sustainability in higher education

Since the United Nations (UN) declared the decade of education era for sustainability development in 2003, various courses related to sustainability have contributed to the curriculum in universities across the United States and European Union. Christensen, Peirce, Hartman, Hoffman, and Carrier (2007) examined course offerings of sustainability-related courses through surveys and interviews with deans of top 50 global Master of Business Administration (MBA) schools. In this study, they found that 84% of top 50 MBA schools required students to take at least one course related to sustainability, business ethics, and corporate social responsibility, 25% of the schools offered those courses as independent courses, and 65% of the schools operated a center to support sustainability-related initiatives.

Wu et al. (2010) conducted a web-based content analysis of the sustainability-related curricula of 642 European and American business schools and generated a list of 39 key SRTs from various reports and academic papers (Table 1). In their study, they found the top 10 sustainability-related themes (SRTs) in the management curriculum were ethics, sustainability, corporate social responsibility, sustainable development, natural resource, energy, culture diversity and intercultural understanding, climate change, peace and human security, and ecology (in rank order). The top ranked schools had more sustainability courses at the graduate level whereas non-top ranked schools had

<Table 1> Sustainability-related themes used for curriculum analysis

Biodiversity	Human rights
Climate change	Market economy
Community engagement	Natural resource
Corporate citizenship	Natural resources management
Corporate environmental responsibility	Peace and human security
Corporate responsibility	Pollution management
Corporate responsibility and accountability	Poverty prevention
Corporate social responsibility (CSR)	Race relations
Culture diversity and intercultural understanding	Recycle
Disaster prevention and mitigation	Renewable energy
Ecology	Reuse
Ecosystem	Rural development
Energy	Sustainability
Environmental health and safety	Sustainable development
Environmental stewardship	Sustainable growth
Equal opportunity	Sustainable procurement
Ethics	Sustainable urbanization
Fair trade	Triple bottom-line
Gender equality	Waste
Greening	

From Wu et al. (2010). p. 524.

more in the undergraduate level than others. Chawla (2015) also conducted a content analysis of courses of the hospitality field and found that 37% of 33 British universities offered learning related to the sustainability themes as stand-alone modules and environment/greening issues were often observed in the curricula.

3. Sustainability education in textile and apparel

There have been efforts to incorporate the sustainability concept in the T&A courses. Several researchers (Landgren & Pasricha, 2011; Pasricha, 2012) introduced a case applying sustainability to T&A education, using diverse teaching methods including intensive literature review, problem-solution discussion, and project-based studies. Sustainability education in the T&A area included consumers' consciousness, material sourcing, fair trade transaction, fair use of labor, and sustainable product planning and marketing strategies as critical topic areas (Orzada & Cobb, 2011).

Dickson, Eckman, Loker, and Jirousek (2013) offered web-based graduate courses inter-institutionally with the goal of developing the capabilities of students to be future influencers that carry on sustainable values for business and society. From this, the University of Delaware's "Certificate in Socially Responsible and Sustainable Apparel Business" was developed. UD's sustainability education program offers courses in "Risks of Human Trafficking and Slavery for Supply Chain Professionals", "Human Rights of Workers in Supply Chains", "Textile and Apparel Product Safety", and "Impact of Corporate Purchasing Practices on Workers in Supply Chains". Among these, "Risks of Human Trafficking and Slavery for Supply Chain" is popular with the course completed by 2,500 practitioners of 34 global T&A

companies (UD, n.d.). University of Delaware (UD) is a member of SAC and sponsors the Sustainable Apparel Initiative (SAI) program which is the special program for sustainability research and education for undergraduate and graduate students as well as practitioners.

Several documented efforts to develop sustainability-infused design education programs are found. Gam and Banning (2011) combined the problem-solving approaches to help students design and produce an original sustainable garment using environment-friendly materials or recycled materials in an undergraduate course. Lee and Choy (2014) developed the fashion design education program for students to better understand the value of recycled products by adding a section of developing sustainable fashion products within a course. Yoon and Yim (2015) introduced a design method for zero-waste garment making while Jang (2015) introduced a capstone design course based on academy-industry collaborations for sustainability, using problem-based learning methods. Although we see reports of sustainability education within specific courses, there is limited research exploring a broader overview of how sustainability is covered in courses across T&A institutions. This study offers a valuable reference for educators to understand how sustainability education has evolved in the T&A field and how diverse sustainability themes have been incorporated in the different subject fields.

Ⅲ. Methods

University rankings have been frequently adopted as a selection criterion in curriculum surveys (Wu et al., 2010). The top 50 schools were selected for the study as the institutions provide sound curriculum representation and have been used for various curriculum studies (Evans & Marcal, 2005). For data collection, 69 educational institutions were selected from 2015 U.S. rankings of the top 50 fashion design and top 50 fashion merchandising colleges by Fashion Schools (2015a, 2015b). Thirty-one institutions appeared in both lists. A total of 3,200 web-published course descriptions offered in each department/school were analyzed through content analysis, following research methods adapted to curricula research (Chawla, 2015; Navarro, 2008; Wu et al., 2010). Content analysis of web-published course description data was selected as the appropriate research method given the nature of data (Wu et al., 2010).

Web-published course descriptions affiliated with T&A programs were collected by visiting the published online content of all listed institutions. A few institutions (i.e., California College of the Art, Moore College, School of the art institute of Chicago, University of Cincinnati) provided only the 2015-2016 course offerings on their webpage, thus descriptions of only those courses were used for coding. Otherwise, course descriptions presented in the university webpages on January 2016 were submitted for content analysis.

Coding procedures were conducted following guidelines for qualitative research (Miles, Huberman, & Saldana, 2013). In the coding process, sustainability-related courses identified from 3,200 courses were examined in the study. When at least one sustainability-related term appeared in the title or description of course, it was counted as a sustainability-related course. Considering a wide variety of topics and concepts related to sustainability, a list of 39 sustainability-related terms were generated from an intensive review of industry and academic papers and included in the coding guide (Wu et al., 2010) (Table 1). Two coders who are university researchers reviewed 3,200 course descriptions and coded the data based on the coding manual with detailed coding instructions. During the coding process, the two researchers engaged in a discussion of how codes would be defined in the coding manual. Because it is essential to perform a coder-check procedure across coders in the early stage of coding (Miles et al., 2013), the two

coders discussed inconsistencies after completing coding of the first 10 universities and added more detailed instructions and standards to the coding manual, then coded again using the updated coding manual.

Frequency of sustainability themes found in course descriptions and institutional data were coded (i.e., program ranking, offering of graduate program, and total number courses offered). Courses listed with the same course title in the curriculum but separately for undergraduate and graduate levels were coded as unique cases whereas dual-listed courses for general students and honors students were counted once. For the number of total courses, some courses such as independent study, special topics, internship, undergraduate/graduate research, field study, domestic/ international travel course, course for 1 or 2-year programs/professional school students and other varied credit varied courses were not counted because no specific course descriptions were offered. Each course was coded by subject area from the listing of six subject areas in the T&A field: industry/consumer, fashion design, social psychology/education, textile science, history/culture, and "all". A course not indicating any specific subject such as *Seminar on fashion and sustainability* was coded as "all". These categories are based on the classifications by the International Textile and Apparel Association (ITAA) (www.itaaonline.org; ITAA, n.d.).

To check the consistency across two coders, Cohen's Kappa score was calculated. Cohen's Kappa weighted was .975 (SE=.012) indicating good inter-rater reliability, exceeding the .800 which is a standard for the good consistency (Fleiss, 1981). Coded data were analyzed through descriptive statistics, correlation analysis, and independent sample t-test. The followings are a few examples of SRTs extracted from course titles and/or descriptions (see Table 2).

Ⅳ. Results

1. Theme of sustainability courses taught in the textile and apparel area

Results show a total of 3,200 courses (2,701 undergraduate courses and 500 graduate courses) were offered by 69 institutions in fashion merchandising and fashion design; 129 sustainability-related courses (4.03% of courses) were offered by 38 (55.1%) institutions. Based on examination of course descriptions, SRTs mentioned in the course descriptions were sustainability (64 courses), social responsibility (43), ethics (30), environmental safety (16), human rights/ labor issue (13), ecology/ecosystem (10), and cultural diversity (7), recycle/reuse (3), greening (2), fair trade (1), triple-bottom line (1) (Table 3). The top three SRTs in the T&A curriculum are sustainability, social responsibility, and ethics. These findings are similar to the previous reports in the management literature (Matten & Moon, 2004; Wu et al., 2010).

2. Offering of sustainability courses by textile and apparel subject fields

Subject fields where sustainability is taught in courses are summarized in ⟨Table 4⟩. Industry/ consumer is the field with the highest frequency of sustainability and fashion design is the field with the second highest frequency. Sustainability courses are taught in textile and apparel subject fields of industry/ consumer (70 courses, 55.6%), fashion design (25, 19.8%), social psychology/education (9, 7.1%), textile science (7, 5.6%), and history/culture (6, 4.8%). Also, there were nine sustainability-related courses (7.1%) applied to "all" areas.

Themes that were often taught in each field were explored through t-test analysis (Table 5). The frequencies of the theme (i.e., sustainability) found within specific subjects (i.e., textile science) were cross compared with other subject fields. In results, themes related to recycle/reuse (t=−6.196, p<.001) were found most often in textile science; sustainability (t=−3.366, p<.01) in fashion design; cultural diversity in social psychology/education (t=−4.839, p<.001) and his-

<Table 2> Examples of sustainability-related themes extracted from course titles and descriptions

Course title (University)	Course description	Sustainability-related theme
Advanced apparel product development (U of Delaware)	The product development process as applied in the apparel industry. Focuses on business planning, marketing, market research, distribution, the product development calendar, and challenges relating to apparel business situations. Evaluates how product development activities supports *sustainability*.	Sustainability
Seminar on *sustainability* (U of Delaware)	Introduction to emerging cannon of theory and practice regarding Sustainability as it relates to fashion. Centered on four components of *Sustainability* and *Social Responsibility: Labor, Environment,* Consumption and Body Image	Environmental safety, human rights/labor, social responsibility, sustainability
International *Corporate Responsibility* (FIT)	Students study the *sustainability* movement, and how *ethical,* social, and *environmental* issues are being addressed by multinational corporations. Through the review of current case studies, the course examines the role of fashion businesses in creating socially responsible and *eco-friendly* global supply chains and their effect in international trade policies.	Ecology/eco system, environmental safety, ethics, social responsibility, sustainability
Production and technical design (FIT)	This course stresses the relationship between technical design and the apparel production cycles and manufacturing processes. Discussions center on sourcing and logistics, apparel standards, compliance and regulations, current industry issues, and business *ethics* and conduct.	Ethics
Cross cultural aspects of the near environment (Oregon State U)	Sociocultural study of the function and design of clothing, housing, interiors, and textiles. *Cultural diversity*; impact of cross-cultural contact; ethnicity	Cultural diversity
Renewable materials in the modern age (Oregon State U)	Micro-renewable materials anatomy course taught within an interdisciplinary, hands-on format. Suitable for all majors and backgrounds. Course covers the micro- and macro-anatomy of wood and other common *renewable* materials like bamboo and cellulose fibers. Utilizes studio-based learning	Reuse/recycle

tory/culture ($t=-4.209$, $p<.001$); and social responsibility ($t=-3.074$, $p<.01$) and ethics ($t=2.837$, $p=.005$) in the industry/consumer field. However, some themes were taught less in specific subject fields. Less taught content areas were social responsibility ($t=2.620$, $p<.05$) in textile science; cultural diversity ($t=2.200$, $p<.05$) in fashion design; sustainability ($t=2.411$, $p<.05$) and ecology/eco system ($t=2.850$, $p<.01$) in the industry/ consumer field. A natural match between subject areas and specific sustainability themes was observed. Cultural diversity themes are more commonly found in history/culture, recycle/reuse in textile science, and ethics in industry/consumer than in other subject fields.

3. Offering of sustainability courses by textile and apparel institutions

Institutions offering a higher number of sustainability courses were University of Delaware (24), Fashion Institute of Technology (14), University of Cincinnati (11), and Kansas State University (7) (Table 6). Course titles including sustainability terms are limited, reflecting most of courses include sustainability terms in course descriptions. It indicates varied courses comprise sustainability concepts and practices as a part of the whole course, rather than focusing fully on sustainability.

Correlation results show both an institution's rank in fashion merchandising ($r=-.319$, $p=.024$) and rank

<Table 3> Sustainability-related themes (SRT) taught in the textile and apparel area

Course theme	Rank	Frequency
Sustainability	1	64
Social responsibility	2	43
Ethics	3	30
Environmental safety/ environmental stewardship	4	16
Human rights/labor	5	13
Ecology/eco system	6	10
Cultural diversity	7	7
Recycle/reuse	8	3
Greening	9	2
Fair trade	10	1
Triple-bottom line	10	1

Multiple response items.

<Table 4> Offering of sustainability-related courses by subject fields

Subject field	Rank	Frequency	%
Industry/consumer	1	70	55.6
Fashion design	2	25	19.8
Social psychology/ education	3	9	7.1
All	3	9	7.1
Textile science	5	7	5.6
History/culture	6	6	4.8
Total		126	100

in fashion design (r=−.286, p=.047) were negatively related to the number of sustainability courses; however, the number of total courses (r=.434, p<.001) was positively related to the number of sustainability courses. These results indicate that more sustainability-related courses are being offered in higher ranked institutions in fashion merchandising and fashion design and institutions offering more courses. No relationship was found in the number of sustainability courses between institutions with and without graduate programs, implying that the sustainability-related courses are not always offered more in graduate programs. A considerable number of sustainability-related courses are being offered in the undergraduate programs of the textile and apparel disciplines (Table 7).

V. Conclusion and Discussion

In this study, a web-based content analysis of the course offerings of the top 50 fashion design and fashion merchandising schools in the U.S. was conducted to examine sustainability education patterns in the T&A area. Findings show sustainability is being combined and incorporated within the courses and curricula of T&A programs in the U.S. Over half of the universities examined in this study offered at least one sustainability embedded course among their course offerings. Similar to the business management field (Wu et al., 2010), sustainability, social responsibility, and ethics are themes most frequently offered. Environmental safety, human rights, and ecology/eco system are the next primary themes most often present in T&A courses and curriculum. These findings reflect ongoing concerns to reduce pollution that harm the environment and people. In addition, sound practices related to the workforce in domestic and international production sites are amplified. Higher ranked institutions in fashion merchandising and fashion design offer more sustainability-related courses. On the other hand, this study offers evidence that sustainability is pervasive across all institution types and levels; institutions with graduate programs do not necessarily provide more sustainability courses indicating no difference in sustainability education between institutions offering advanced degrees versus undergraduate degrees.

Industry/consumer and fashion design are subject fields in which sustainability concepts are most often integrated in courses. Emerging issues in sustainability

\<Table 5\> Offering of sustainability-related courses by subject fields: *t*-test results

Subject field	Textile science	Fashion design	Social psychology/ edu	History/ culture	Industry/ consumer
Sustainability	1.182 (.240)	−3.366** (.001)	1.142 (.256)	1.414 (.160)	2.411* (.017)
Cultural diversity	1.162 (.247)	2.200* (.030)	−4.839*** (.000)	−4.209*** (.000)	−.282 (.779)
Social responsibility	2.620* (.010)	.562 (.575)	1.096 (.275)	−.500 (.618)	−3.074** (.003)
Ethics	.564 (.574)	1.375 (.172)	1.499 (.136)	.780 (.437)	−2.837** (.005)
Human rights/labor	.292 (.770)	1.735 (.085)	−.298 (.766)	.494 (.622)	−1.610 (.110)
Environmental safety	−1.812 (.072)	.281 (.779)	−.378 (.706)	.474 (.636)	.962 (.338)
Ecology/eco system	−1.814 (.072)	−1.015 (.312)	−1.060 (.291)	.339 (.735)	2.850** (.005)
Greening	−1.451 (.149)	−.275 (.783)	.417 (.678)	.218 (.828)	.621 (.536)
Recycle/reuse	−6.196*** (.000)	1.045 (.298)	.417 (.678)	.218 (.828)	1.802 (.074)
Fair trade	.319 (.750)	.597 (.552)	.239 (.812)	.125 (.901)	−.977 (.331)
Triple-bottom line	.319 (.750)	.597 (.552)	.239 (.812)	.125 (.901)	−.977 (.331)

t-values and *p*-values are presented.

\<Table 6\> Universities offering sustainability-related courses

University	Rank	Frequency	Course titles
University of Delaware	1	24	Advanced apparel product development; Apparel design by draping, Apparel design by flat pattern; Apparel structures; Design expressions; Global apparel and textile and trade and sourcing; International fashion consumer and retailers; Product development and management studio; Seminar on fashion and sustainability; Strategic fashion management; Apparel consumers and social responsibility; Apparel supply chains & social responsibility; Bringing social responsibility to apparel corporate culture; Culture & work in the apparel industry; Current initiatives for apparel industry labor compliance; Interdisciplinary approaches to problem solving; Producing environmentally responsible apparel; Redesigning green apparel: Design, sourcing & packaging; Socially responsible apparel: Global policy; Sustaining global apparel supply chains; Worker-centric social responsibility for apparel industry; Fundamentals of textiles 1; Fundamentals of textiles 2; Fashion forecasting & design
Fashion Institute of Technology	2	14	Corporate social responsibility; Digital literacy for designers; Fashion business practices; Global marketing of luxury brands; Introduction to knitwear design; International corporate responsibility; Performance textiles; Production and technical design; Sustainability in fashion merchandising; Tabletop and related products; Textile coloration: Principles and processes; Textile finishing: Principles, practices and advancements; Textile value chain marketing: Concept to consumer; Capstone design

<Table 6> Continued

University	Rank	Frequency	Course titles
University of Cincinnati	3	11	Industry, theory, and practice; Trend forecasting: Research methodology and development; Designing to brand; Design communication 3; Design communication 4; Entrepreneurship; Fashion A: Senior capstone; Fashion B: Product development capstone; Fashion design 1; Fashion marketing and brand development; History of fashion 2
Kansas State University	4	7	Apparel and textile industry, Apparel and textiles retailing, Foundations of sustainability in apparel and textiles, Promotional strategies in merchandising, Fashion behavior & Sustainability, Textile sustainability; Textiles
Fashion Institute of Design and Merchandising	5	5	Business ethics; Contemporary business strategies; Global human resource management; Sustainability & the fashion industry; Sustainable textiles in the production cycle
Academy of Art University	6	4	Retailing and management; Sustainable design; Fashion and sustainability; Retail management and operations
Iowa State University	6	4	Dress and diversity in society, sourcing and global issues, foundation of scholarship in textiles and clothing, Sustainability: Theory and practical application
Oregon State University	6	4	Cross cultural aspects of the near environment; Introduction to retail buying; Renewable materials in the modern age; Research in the cross-cultural aspects of the near environment
University of North Texas	6	4	Consumers in a global market; Sustainable strategies in merchandising; International sourcing; Seminar in design sustainability
Marist College	10	3	Fashion in culture & commerce; Global merchandising strategies; Sustainability in fashion
North Carolina State University	10	3	Design skill workshop; Fashion and the consumer; Textiles and apparel labor management
Parsons School of Design	10	3	Ethical fashion; Fashion cultures; Zero waste garment
School of Art Institute of Chicago	10	3	Fashion: Fas Des Stud III: Cont Fashion; Fashion: Outer skin: Fur & fur alike; Fashion: Supply and surplus-area of study: sustainability
University of Minnesota	10	3	Dress and culture; Dress, society, and culture; Fashion, ethics, and consumption
University of Nebraska	10	3	Care and conservation of textile collections; International textile and apparel sourcing; Promotional strategies in merchandising

could also be more actively adopted in other T&A subjects in the future as connections are emphasized. A natural match between subject area and specific sustainability theme is observed (e.g., cultural diversity in history/culture and social psychology/education; recycle/reuse in textile science; sustainability in fashion design; social responsibility and ethics in industry/consumer). As cultural diversity continues to be recognized as a critical area, further understanding related to global consumers and overseas workforce is important to the success of the global business in the T&A area. As recycle/reuse has been a big issue in textile science, recent research efforts and business practices of developing and utilizing recycled materials for product designs are distinctly growing in the T&A area (Gam & Banning, 2011; Joule, 2011; Kim, 2010; Lee & Choy, 2014). Recycle/reuse themes should also be more actively applied to the fashion

<Table 7> Correlations among the number of sustainability-related courses (SRC) and institution characteristics

Variables	Rank in fashion merchandising	Rank in fashion design	Offer grad. program	N of total courses	N of SRC
Rank in fashion merchandising	1				
Rank in fashion design	.891*** (.000)	1			
Provide grad. program	−.497*** (.002)	−.495** (.003)	1		
N of total courses	−.446** (.001)	−.368** (.009)	.260 (.078)	1	
N of SRC	−.319* (.024)	−.286* (.047)	.241 (.102)	.434** (.000)	1

*$p<.05$, **$p<.01$, ***$p<.001$.

design and product development curriculum. Similar to the business management field, social responsibility and ethics are often applied to industry/consumer courses as human rights and fair-trade issues are commonly recognized in the T&A industry.

There is smaller effort to deal with some sustainability-related themes in the T&A curriculum. Although natural resource management, climate change, and renewable energy issues are critical to better understand the changes of sourcing cost and the imbalance between supply and demand of natural resources for the T&A industry, there were few course embracing those terms in the course descriptions. In addition, issues focusing on human resource management such as equal opportunity, gender equality, race relations, and human security are scarcely mentioned.

Our findings may offer university educators and administrators a deeper understanding of the status of sustainability education in the T&A area and stimulate ideas on diverse sustainability courses in varied subject fields. For example, the most commonly found sustainability themes (i.e., sustainability, social responsibility, ethics, environmental safety, human rights) can be developed into independent courses. Other themes in sustainability discussed in the results

can also be incorporated within many subject fields to prepare students.

There is a need to offer a holistic view of sustainability within a course as highlighted by researchers in other fields (Boley, 2011). Diverse dimensions and concepts should be integrated within the courses through varied practices and problem-solving methods to help students better understand the massive applicability of sustainability to many different kinds of activities in each subject. A combined use of various teaching methods such as literature review, case study, discussion, and purpose-based projects would build a more complete view of sustainability in the T&A area. Hands-on experiences of sustainability-related activities and projects (i.e., design of zero-waste garment, development of sourcing plan of eco-friendly materials) would be a good stimulus to improve awareness on sustainability. As more fashion programs are incorporating sustainability content into the curriculum, curricular learning competencies and assessment strategies should be studied.

The curriculum data for the present study were obtained from 3,200 courses of 69 institutions. In this study, although frequency comparisons were mainly used for analysis, the size and characteristics of

departments and programs may be considered when interpreting the results for context. This study did not explore non-American schools such as European and Asian institutions. In future research, a comparison study of curriculum data of a wide range of universities worldwide could provide interesting insights. Also, future research should incorporate qualitative methods including interviews with course instructors as well as students to incorporate personal experiences. Despite these limitations, the findings from this study offer a new interesting perspective related to sustainability education in the T&A area based on publicly available information. This study offers insight into current practices and opportunities for integrating sustainability education across the subject areas of T&A.

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